

REMARKS

Claims 1-13 and 15-25 are pending in the application upon entry of the amendments. Claims 6, 9, 15, and 16 have been amended for consistency and to better describe certain aspects of the invention. Since the amendments place the application in condition for allowance, do not require new searching, and/or remove issues in the event of an appeal, entry is respectfully requested. Favorable reconsideration in light of the amendments and the remarks which follow is respectfully requested.

The Amendments

Claims 6 and 15 have been amended to address concerns raised by the Examiner. Claims 9 and 16 have been amended to include certain subject matter of claim 6; namely, to recite specific amine-borane compounds effective in achieving high quality Ni-Co-B alloys in accordance with the invention.

Objection to the Claims

Claim 15 has been objected to for a misspelling. Claim 15 has been amended as suggested by the Examiner.

The Indefiniteness Rejection

Claim 6 has been rejected under 35 U.S.C. §112, second paragraph, for a typographical error. The subject brightener has been better specified as suggested by the Examiner.

The Invention

Before distinguishing the cited art, a brief overview of the invention is in order. The invention relates to making high quality Ni-Co-B alloys using a bath containing nickel ions, cobalt ions, an amine-borane compound, and an acetylenic brightener. Novelty is not disputed. The high quality Ni-Co-B alloys are achievable for two main

reasons. First, the presence of an acetylenic brightener causes the uniform placement of metallic boron, within the matrix of a Ni-Co alloy. This action is not easy since the nickel and cobalt being plated is ionic while the boron being plated is NOT ionic boron, but rather a complexed borane. Second, using a complexed borane instead of ionic boron provides a more attractive alloy because the boron plates in an electroless fashion with uniform distribution. However, when plating in an electroless fashion, there is an increased sensitivity to the remaining components of the bath because of possible detrimental effects of components having undesirable oxidative/reductive potentials.

The Obviousness Rejection Involving Independent Claim 1

Claims 1-8 and 23 have been rejected under 35 U.S.C. §103(a) over JP 63-239848 (hereinafter "JP '848") in view of Passal (U.S. Patent 3,697,391).

JP '848 relates to a method for manufacturing a lead frame comprising electroplating a Ni-Co-B alloy layer on the surface of a lead frame. In JP '848, an electroplating bath for electrodeposition of Ni-Co-B alloys on copper lead frames contains nickel ion, cobalt ion and trimethylamine borane.

Passal relates to a process for electroplating Ni, Co, or Ni-Co alloys, wherein all metals are plated in ionic form. Passal uses a primary brightener (including acetylenics), a secondary brightener, and an organic hydroxy-sulfonate adduct to improve tolerance to metallic impurities.

The Examiner contends that it would have been obvious to modify the method of JP '848 by using one of the brighteners of Passal. Applicants respectfully disagree.

The brighteners of Passal are employed to improve the appearance of electrodeposited Ni, Co, or Ni-Co alloys. There is NO teaching or suggestion in Passal indicating that its acetylenic brighteners would be effective for improving the appearance of Ni-Co-B alloys. There is NO teaching or suggestion in Passal indicating that its acetylenic brighteners cause the uniform placement of boron, in an electroless fashion, within the matrix of a Ni-Co alloy. While JP '848 relates to making a Ni-Co-B

alloy, JP '848 is silent as to brighteners in general. Thus, there is NO teaching or suggestion in JP '848 to employ an acetylenic brightener.

Since both JP '848 and Passal fail to motivate one skilled in the art to employ an acetylenic brightener to make a Ni-Co-B alloy, the Examiner seems to contend that one skilled in the art would have made this specific combination. In order to support the Examiner's combination, the Examiner cites functions (1) to (4) of Column 3 of Passal attributable to the primary brighteners, secondary brighteners, and secondary auxiliary brighteners. However, this contention is based only on impermissible hindsight, made with the guidance of the instant specification.

The beneficial functions (1) to (4) on page 9 of the Office Action are general desirable effects, and Passal indicates that these desirable effects provided by the listed primary brighteners, the listed secondary brighteners, and the listed secondary auxiliary brighteners. However, Passal fails to teach or suggest which specific beneficial functions (1) to (4) are enabled by the specifically listed primary brighteners, secondary brighteners, and secondary auxiliary brighteners. Moreover, Passal fails to teach or suggest which specific beneficial functions (1) to (4) are enabled by acetylenic brighteners.

In this connection, Passal describes four generic groups and ten specific compounds of primary brighteners, four generic groups and five specific compounds of secondary brighteners, and twelve generic groups and seven specific compounds of auxiliary secondary brighteners. Passal fails to teach or suggest any specific function for any specific primary brighteners, secondary brighteners, and secondary auxiliary brighteners.

The purpose of JP '848 is to provide Ni-Co-B alloys that effectively bond to copper substrate lead frames in the semiconductor arts. The small nature of the semiconductor arts is one reason why the thickness of the Ni-Co-B alloys of JP '848 is from 0.3 to 10 microns. JP '848 is unconcerned with appearance, which is one reason why brighteners are not mentioned because the appearance of a metal plate in a semiconductor device is of no value. In fact, in the metal plating arts, having a matte or

grainy surface means that the metal plate has a larger surface area and thus a greater ability to bond to a given substrate. Since the main purpose of JP '848 is to improve the bonding of Ni-Co-B alloys to specific substrate, one skilled in the art would not have modified JP '848 by using a compound such as brightener that would DECREASE the resultant alloys ability to bond to a substrate. In other words, one skilled in the art would NOT have frustrated the purpose of JP '848 by including an additive that would impede the bonding between its plated alloy and substrate.

Since there is no teaching or suggestion in Passal that acetylenic brighteners would be effective for improving the appearance of Ni-Co-B alloys, and since there is NO reason to improve the appearance of the Ni-Co-B alloys of JP '848, it would NOT have been obvious to one skilled in the art to modify JP '848 by using an acetylenic brightener. Since one skilled in the art would NOT contravene the clear teaching of JP '848 to improve alloy-substrate bonding, one skilled in the art would not use a brightener in the bath of JP '848. Moreover, it would NOT have been obvious to one skilled in the art that the acetylenic brighteners of Passal cause the uniform placement of metallic boron within the matrix of a Ni-Co alloy. Therefore, there would have been no motivation for one skilled in the art to modify JP '848 by using an acetylenic brightener to improve placement of boron atoms.

For at least the above-mentioned reasons, withdrawal of the rejection of claims 1-8 and 23 is respectfully requested.

The Obviousness Rejection Involving Independent Claim 9

Claims 9-12 and 24 have been rejected under 35 U.S.C. §103(a) over JP '848 in view of Passal. Independent claim 9 and claims dependent therefrom are NOT obvious over JP '848 and Passal for substantially the same reasons that claim 1 is not obvious over JP '848 and Passal (one skilled in the art would not have modified JP '848 with an acetylenic brightener of Passal).

Claim 9 and claims dependent therefrom are NOT obvious over JP '848 and Passal for the additional reason that the combination of cited art fails to teach or

suggest the specific amine-borane compounds required by claim 9. Although JP '848 mentions using trimethylamine borane, this specific compound is used for the purpose of improved bonding of the resultant Ni-Co-B alloy to copper substrate lead frames. Due to the advantageous result achieved with a specific amine-borane compound, one skilled in the art would not have been motivated to employ a different amine-borane compound in the absence of a teaching that an alternative amine-borane compound could improve bonding of a Ni-Co-B alloy to a copper substrate lead frame.

Moreover, trimethylamine borane is different from and NOT equivalent the amine-borane compounds required by claim 9. For example, trimethylamine borane is much less soluble than the amine-borane compounds required by claim 9.

For at least the above-mentioned reasons, withdrawal of the rejection of claims 9-12 and 24 is respectfully requested.

The Obviousness Rejection Involving Dependent Claim 13

Claim 13 has been rejected under 35 U.S.C. §103(a) over JP '848 in combination with Passal further in view of SU 1,544,847 (hereinafter "SU '847"). SU '847 discloses a betaine of 2-(4-pyridyl)ethanesulfonic acid 0.3-1.5 g/L as an additive to acid electrolytes for producing composite coatings based on Ni-Co alloy. Claim 13 is NOT obvious over JP '848, Passal, and SU '847 for substantially the same reasons that claim 9 is not obvious over JP '848 and Passal.

The Obviousness Rejection Involving Dependent Claim 15

Claim 15 has been rejected under 35 U.S.C. §103(a) over JP '848 in combination with Passal further in view of JP 10-245693 (hereinafter "JP '693"). JP '693 relates to forming a nickel alloy by electroplating. JP '693 requires a N-heterocyclic quaternary ammonium salt as a brightener. Claim 15 is NOT obvious over JP '848, Passal, and JP '693 for substantially the same reasons that claim 9 is not obvious over JP '848 and Passal.

The Obviousness Rejection Involving Independent Claim 16

Claims 16-22 and 25 have been rejected under 35 U.S.C. §103(a) over JP '848 in view of Passal. Claims 16-22 and 25 are NOT obvious over JP '848 and Passal for substantially the same reasons that claim 9 is not obvious over JP '848 and Passal (claim 16 requires specific amine-borane compounds not described by the cited art) and for substantially the same reasons that claim 1 is not obvious over JP '848 and Passal (one skilled in the art would not have modified JP '848 with an acetylenic brightener of Passal).

Petition for Extension of Time

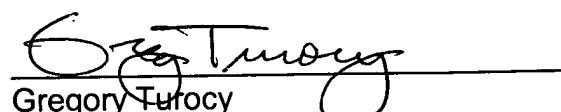
A request for a one month extension of time is hereby made (small entity status has been established). A Credit Card charge form is enclosed herewith to pay the petition fees.

Should the Examiner believe that a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

In the event any fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to our Deposit Account No. 50-1063.

Respectfully submitted,

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